

## **OPERATIONS**

The purpose of this section is to evaluate the operation, support and siting of air monitoring instrumentation according to EPA requirements at 40 CFR 58, Appendices A, C, D and E. Network operations at the ARB are primarily performed by the Air Quality Surveillance Branch (AQSB) of MLD. AQSB duties include the operation of the ARB monitoring sites, monitoring support for the ARB special studies, and general air monitoring support, which includes repair and calibration facilities. This section of the TSA report addresses AQSB's general operations, the calibration program, field operations of the AQSB at the ARB operated criteria pollutant monitoring sites, and field operations at criteria pollutant monitoring sites operated by the San Joaquin Valley APCD, the Great Basin Unified APCD and the Northern Sierra AQMD.

EPA interviewed those managers and staff of the Air Quality Surveillance Branch (AQSB) who provide support to the field monitoring task. The individuals interviewed included Ken Stroud, Chief Air Quality Surveillance Branch, Reginald Smith, Manager Operational Support Section, Eric McDougall, Manager Special Purpose Monitoring Section, Joe Rohr, Instrument Technician Operations Support Section, and Ronald Lewis, Air Pollution Specialist Air Monitoring Central Section. All persons in the Air Quality Surveillance Branch interviewed were very helpful and forthcoming. The AQSB has a well developed framework to support the MLD monitoring task. It was particularly noted that the Operational Support Section includes functions that add significant value to AQSB's monitoring program, both in terms of technical expertise and improved monitoring data quality.

### **General Findings on ARB Operations**

**Finding AQSB1:** Field operators do not always document shipping information on their sample report/tracking sheets. See also Lab Finding #IL7

**Discussion:** Documentation of sample shipping, transport, and relinquishment, maintains sample custody throughout the sampling process, attests that sample were handled properly, and documents by whom they were handled. This information is important if a question about a sample's validity arises.

**Recommendation:** Ensure that field operators are aware of the importance of documenting shipping information.

**Finding AQSB2:** Some ARB MLD monitoring SOPs are outdated and/or incomplete.

**Discussion:** ARB should develop a schedule for updating all monitoring SOPs and ensure that the SOP's posted are complete and cover all instruments used in the ARB monitoring network

**Finding AQSB3:** White out was noted on an MLD air monitoring form.

**Discussion:** It was noted that white out was used on a form produced by the MLD monitoring group. Changes to official records should not be covered or obliterated. Generally, mistakes should be indicated by a single line crossed out and with an initial and date.

**Recommendation:** ARB personnel should follow appropriate procedures when making corrections to official documentation and records.

### **Instrument Calibration Program**

ARB is responsible for calibrating its own criteria pollutant monitors and offers calibration support to districts if requested. Of the approximately 341 criteria pollutant monitors in the ARB PQAQ, ARB calibrates 139 instruments (96 ARB instruments and 45 District instruments). ARB also calibrates some non-criteria pollutant instruments. Of the approximately 97 non-criteria pollutant instruments and 113 meteorological instruments, ARB calibrates its own 39 non-criteria instruments and 37 meteorological stations and calibrates 11 District operated non-criteria instruments and 2 District operated meteorological stations.

**Finding AQSB4:** ARB MLD does not calibrate monitoring equipment at all PQAQ sites.

**Discussion:** Over the past decade the ARB MLD monitoring sections have reduced calibration support for District sites. Consequently, Districts have established their own instrument calibration procedures independent of the ARB PQAQ. This practice does not support the existence of a centralized standardization of instrumentation and consequently consistent data quality throughout the PQAQ.

**Recommendation:** The corrective action for this finding is dependent on how the EPA, the ARB and the local Districts address the overall organization issues of the ARB PQAQ.

**Finding AQSB5:** Second level review of calibration records and calculations is not routinely done.

**Discussion:** The senior field technicians are responsible for calibration of the ARB MLD field instruments for their respective monitoring sections (North, South, and Central). These technicians generate calibration records, which are not necessarily reviewed by a peer or a manager. Second level review is important to ensure consistency and to catch errors made in transcriptions or calculations.

**Recommendation:** The ARB needs to institute a program of second level review of calibration records.

**Finding AQSB6:** The lowest ozone calibration point is at a concentration that is above the 8 hour standard.

**Discussion:** The ARB MLD Air Quality Surveillance Branch calibrates ozone monitors down to 0.09 ppm. This concentration is above the NAAQS of 0.08 ppm. In order to verify linearity around or below the NAAQS, ARB should change the low ozone calibration point to at or below 0.08 ppm.

**Recommendation:** The ARB calibration program needs to ensure the performance of ozone instruments at levels at or lower than the ozone NAAQS. EPA suggests this be accomplished by using a lowest calibration point at or below 0.08 ppm.

**Finding AQSB7:** The calibration technician noted that only 2 gas phase titration points are used to verify the NO<sub>2</sub> calibration.

**Discussion:** 40 CFR Part 50, Appendix F describes the requirements for NO<sub>2</sub> calibration. Section 1.5.9.4 states: “Maintaining the same FNO, FO, and FDas in section 1.5.9.1, adjust the ozone generator to obtain several other concentrations of NO<sub>2</sub> over the NO<sub>2</sub> range (at least five evenly spaced points across the remaining scale are suggested).” Based on the regulation “several” other NO<sub>2</sub> point after the initial must be evaluated.

**Recommendation:** ARB MLD should include more evaluation points in the NO<sub>2</sub> gas phase titration.

**Finding AQSB8:** Maintenance and performance verification of zero air scrubbers used for calibrations is not documented.

**Discussion:** Zero air scrubbers are used in place of certified zero air for instrument calibrations. This is a common practice and acceptable. Because zero air is used to generate the zero point and the calibration mixes it must be treated as a standard. As such, zero air scrubber maintenance and verification must be documented.

**Recommendation:** The ARB needs to begin documenting of the maintenance and performance verification of zero air scrubbers.

### **Special Purpose Monitoring Section**

**Finding AQSB9:** The Special Purpose Monitoring Section should keep EPA informed of its monitoring projects.

**Discussion:** The Special Purpose Monitoring Section conducts monitoring as a “contractor” for the ARB or other agency (e.g., Department of Pesticide Regulation) researchers. Some of this monitoring may be funded wholly or partially by EPA (through ARB or other State Agencies) and could have implications related to NAAQS determinations, network design, or other EPA requirements and/or decision-making. Therefore, where possible and appropriate, an EPA monitoring contact should be informed of monitoring that is taking place.

## FIELD OPERATIONS

During this TSA the EPA audited the operations at 14 monitoring stations as summarized in the following table.

**TABLE 4 MONITORING STATIONS EVALUATED BY  
US EPA DURING THE 2007 ARB TSA**

Operating Agency	Monitoring Station
ARB	Stockton - Hazelton
	Modesto - 14th Street
	Oildale
	Visalia
	Fresno – 1st Street
San Joaquin Valley APCD	Bakersfield – Golden State Highway
	Corcoran
	Parlier
	Tracy
	Fresno – Clovis
Northern Sierra AQMD	Grass Valley
	Portola
	Truckee
	Quincy
Great Basin Unified APCD	Coso Junction
	Dirty Socks
	Lone Pine
	Mono Shore
	Lee Vining
	Mammoth

### ARB Monitoring Sites

Five monitoring stations operated by the ARB were evaluated as part of this TSA. EPA interviewed a number of ARB field technicians, including Ron Lewis, Phillip Powers, Ralph Robles, Dianne Arnold, George Jung, and Patrick Seamus. The ARB is to be commended for having an especially competent staff of field operators. During our discussions of operations, staff all exhibited an extensive knowledge of instrument operations and the day to day documentation of activities was exemplary. Senior field technicians were very engaged in all operations of their sites. EPA also appreciates the relationship the Air Monitoring Central Section has with local District operators. The invaluable technical support provided to the Districts was very evident.

All ARB monitoring sites evaluated were well equipped, organized and clean. The field technicians had access to all relevant SOPs. Stations were set up to automatically perform zero, span and precision checks of continuous gaseous instruments on a schedule that exceeds EPA requirements. The flow rate of low flow PM instruments is checked bi-weekly, calibrations of low-flow samplers is semi-annually. High volume PM sampler flow checks are performed monthly and calibrated semi-annually. Flows are checked at 16.67 lpm for low flow instruments and at 40 scfm for high volume instruments. For gaseous instruments, flow checks are done daily and calibrations are performed semi-annually.

Field technicians interviewed were well versed in their duties regarding data validation and how to address corrective actions. Corrective actions are dealt with on a case-by-case basis. If a site instrument fails an annual audit, specific corrective actions are taken based on consultation with senior field operations staff. The operators are encouraged to document any unusual events in the station log, sample data forms and strip charts. All documentation regarding data editing and validation is reviewed and signed off monthly by the senior field technician before forwarding to the Special Purpose Monitoring and Data Support Section of the Air Quality Surveillance Branch of the Monitoring and Laboratory Division. While deviations from SOPs are rare, in the event that a deviation from a SOP is necessary, it is documented in the station log after consultation with senior field technicians.

All stations maintain log books to document site visits, preventive maintenance, resolution of operational problems, and corrective actions taken. Logbooks were generally very detailed. The senior monitoring technicians periodically review the logbooks and also note in the logbook when they visit the station. A standard, routine review of logbooks is not performed. Operators archive station logbooks at their main monitoring station or office. Other station records include QC checklists and maintenance sheets which are also archived at the operator's main monitoring station or office. All necessary calibration information is available to the field operators.

The ARB has a comprehensive mandatory training program for new monitoring staff. Staff are also given the opportunity to attend refresher courses given by the ARB and instrument manufacturers.

Minor instrument repair work is done at the station. If necessary, equipment is sent to the MLD for major repairs. Replacement equipment is sent to the station within a day to replace any instruments taken out of service for repair. Other than standard manufacturer warranties, the ARB does not have any service contracts in place. Station operators indicated that they have an adequate supply of spare parts and consumable supplies to ensure that necessary repairs and maintenance can be performed.

### **ARB Field Operation Findings**

**Finding AQSB9:** The trees to the east of the Fresno 1st Street station building are about 15 meters from the inlet probe and PM manual instruments.

**Discussion:** EPA siting criteria require that trees are at least 10 meters from instrument inlets and at least 20 meters when the trees act as an obstruction. CARB plan to relocate this station to its proposed new site 375 meters to the east southeast will address this finding.

**Recommendation:** None.

**Finding AQSB10:** At the Stockton-Hazelton monitoring station, a large tree to the south of the trailer is acting as an obstruction for the gaseous pollutant sample train inlet as well as to the PM10 and PM2.5 samplers. This site does not meet the probe siting criteria in 40 CFR 58, Appendix E.

**Discussion:** The obstruction caused by this tree has been noted in previous visits to the site. According to Ron Lewis, Lead Air Pollution Specialist, the tree has been trimmed in the past in an attempt to minimize its affect as an obstruction. The PM manual samplers were previously located on the roof of the Health Department Building but were moved to the top of the station trailer when the Health Department roof was repaired. Ron believed they could return the PM samplers to the roof. If so, the PM samplers would meet all siting criteria.

The inlet for the gaseous instruments will need to be moved or the tree trimmed significantly in order to meet siting criteria.

**Recommendation:** Address siting issues by relocating PM samplers to the roof of the Health Department Building. Develop a plan to address the siting of the gaseous instrument inlet probe by either moving inlet probe (this may not be an option since probe already appears to be as far away from tree as possible), moving the trailer farther from the tree, or by significantly trimming the tree so that it no longer obstructs air flow.

**Finding AQSB11:** The palm tree northwest of the Visalia monitoring station is within 10 meters of the inlet probe.

**Discussion:** As stated in 40 CFR 58, Appendix E (Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring), sections 2.4 and 8.2, trees can provide surfaces for ozone or NO<sub>2</sub> adsorptions or reductions, surfaces for particulate deposition, and generally obstruct wind flow. EPA understands that removing a tree, especially from a leased site, is not always possible. ARB should perform an analysis of the prevailing wind direction at the Visalia site to determine the direction of the prevailing winds. If the prevailing winds are generally from the northwest, ARB will need to correct this siting issue, either by having the tree trimmed or removed or relocating the site.

**Recommendation:** Perform an analysis of prevailing wind directions at the Visalia site to help evaluate the impact of the palm tree northwest of the inlet probe and manual samplers.

## **San Joaquin Valley APCD Monitoring Sites**

Five monitoring stations operated by the SJVAPCD were evaluated as part of this TSA. Three operators were interviewed, Warren Leleaux, Duane Thompson, Jaime Contreas, and Carl Camp. Other SJVAPCD interviewed were Steve Shaw and Kashmir Pandher. The San Joaquin Valley District field technicians are well versed in equipment operations but there are variations in how they perform certain procedures, such as general station documentation and manifold cleaning and conditioning. However, quality control checks and maintenance of equipment are performed in accordance with EPA requirements and guidance. Field technicians are responsible for day-to-day operations as well as instrument repair and maintenance at their assigned stations.

There are no field SOPs available to site operators. Operators rely on instrument operation manuals and ARB SOPs, when available. SJVAPCD operators acknowledged the need for specific instrument and operation SOPs but stated that lack of District monitoring resources made it difficult to address all of the areas in the monitoring program that needed attention.

Stations were set up to automatically perform zero, span and precision checks of continuous gaseous instruments on a schedule that exceeds EPA requirements. The flow rate of low flow PM instruments is checked bi-weekly, calibrations of low-flow samplers is semi-annually. High volume PM sampler flow checks are performed monthly and calibrated semi-annually. Flows are checked at 16.67 lpm for low flow instruments and at 40 scfm for high volume instruments. For gaseous instruments, flow checks are performed each time the field technician visits the site and calibrations are performed semi-annually.

All stations maintain log books to document site visits, preventive maintenance, resolution of operational problems, and corrective actions taken. Logbooks were generally detailed. Operators archive station logbooks at their main monitoring station or office. Other station records include QC checklists and maintenance sheets which are also archived at the operator's main monitoring station or office. All necessary calibration information is available to the field operators.

Corrective actions are dealt with on a case-by-case basis. If a site instrument fails an ARB annual audit, specific corrective actions are taken based on consultation with ARB field operations staff. The SJVAPCD does not have any specific SOPs that address instrument corrective actions. Station operator can note special circumstances on strip chart.

## **SJVAPCD Field Operation Findings**

**Finding SJV1:** The San Joaquin Valley APCD does not have District specific SOPs addressing the operation and maintenance of its air pollution monitoring network.

**Discussion:** The district staff relies on the CARB SOPs for instrument operations. While this is acceptable in practice, the district should ensure that copies of the SOPs are readily available to all station operators. There is no process in place to ensure this will occur.

From a strictly performance perspective, the station operators have a clear knowledge of the monitoring instruments and all required and appropriate QC checks are performed and documented. Yet there are some variations in the QC checks, e.g. concentrations used in span checks for gaseous instruments as well as maintenance procedures, e.g. manifold cleaning procedures.

SOPs detail the work procedures that are to be conducted or followed within an organization. SOPs document the way activities are to be performed to ensure consistent conformance to technical and quality system requirements and to support data quality. SOPs are intended to be specific to the organization or facility whose activities are described and assist that organization to maintain their quality control and quality assurance processes and ensure compliance with governmental regulations. Well-written SOPs can also serve as training materials and as references for operators, particularly if they are updated regularly (i.e., recommended every three years). SOPs should be distributed in a manner that ensures that only the most recent versions are used (controlled-copies). Further guidance on developing SOPs can be found in the EPA guidance document "Guidance for Preparing Standard Operating Procedures", EPA/240/B-01/004, March 2001. Deviations and changes from SOPs should be dated, documented, and kept in a bound or electronic document routinely accessed by and accessible to all staff.

**Recommendation:** The SJVAPCD needs to develop District specific SOPs (with ARB approval) for all pollutant and meteorological monitoring instruments. Alternatively, the SJVAPCD can adopt the ARB SOPs.

**Finding SJV2:** The SJVAPCD field operators do not maintain zero and span or precision check control charts.

**Discussion:** The data logging software used by the District at its monitoring stations can chart QC check data if technician wishes to examine a graphical presentation of QC data, however, there is not a standard practice of printing control charts on any set schedule. This is in contrast to the ARB operations, where the station operators print out and review control charts on a monthly basis as part of the first level data review.

**Recommendation:** As part of the overarching finding on SOPs discussed above, the San Joaquin Valley APCD should develop first level data review SOPs for use by the field technicians. This SOP should require the use of control charts as part of the data review and verification process.

**Finding SJV3:** Station and instrument logbooks are not reviewed by the Supervising Air Quality Instrument Technician.



**Discussion:** There are log books maintained at all stations to document site visits, preventive maintenance, resolution of operational problems and corrective actions taken. The logbooks were all complete, detailed and up-to-date. However, no supervisors review the station logbooks. The SJVAPCD Supervising Air Quality Instrument Technician acknowledged the need for reviewing the logbooks periodically but stated that given the limited number of personnel, the time available to him to perform such supervisory tasks was limited.

**Recommendation:** In order to ensure that field personnel are performing activities consistent with the District SOPs (see SOP discussion above) there needs to be some level of oversight of field staff. This oversight task can either be performed by the Supervising Air Quality Instrument Technician or by a first line supervisor.

**Finding SJV4:** There is no current, consistent procedure in place for archiving all station records.

**Discussion:** Field technicians will generally archived used logbooks at their offices. Instrument maintenance and check sheets which are the record of QC checks are archived at the District office or at ARB. While a decentralized system of archiving station is acceptable, there should be written procedures in place so that field technicians use consistent procedures. Ideally there should be a central, secure facility for all ambient monitoring documentation. Station documentation sent to the ARB should be copied and retained by the District.

**Recommendation:** The San Joaquin Valley APCD should develop a SOP for document and record archiving.

**Finding SJV5:** At the Bakersfield – Golden State Highway site, the area surrounding the trailer which houses the monitoring equipment needs to be stabilized.

**Discussion:** Bakersfield Golden State Highway is one of the higher reading PM10 sites in the San Joaquin Valley District network. EPA regulations at 40 CFR 58, Appendix E, section 8.4 states "Stations should not be located in an unpaved area unless there is vegetative ground cover year round, so that the impact of wind blown dust will be kept to a minimum".

**Recommendation:** Stabilize the parking area where the Bakersfield Golden State Highway trailer is located.

### **Northern Sierra AQMD Monitoring Sites**

The Northern Sierra Air Quality Management District (NSAQMD) operates a network of ozone and PM monitoring instruments. Four monitoring stations run by the NSAQMD were evaluated. Three field technicians were interviewed: Joe Fish, the air monitoring manager, George Ozanich, and Ken Walker. The NSAQMD field technicians

all exhibited a thorough knowledge of equipment operations. All quality control checks and maintenance are performed in accordance with EPA regulations. Field technicians are responsible for day-to-day operations as well as instrument repair and maintenance at their assigned stations. The monitoring manager performs calibrations of the ozone instruments.

The monitoring stations operated by the NSAQMD are not set up to perform automated QC checks. All zero, span, and precision checks for ozone are performed manually about once a week and flow checks of PM instruments are performed once per month, which exceeds EPA requirements.

Northern Sierra AQMD uses the ARB SOPs. Hardcopies of the SOPs are kept at the Grass Valley office/site but not at any other sites. Site operators have the instrument manuals but not the SOPs. Operators keep track of special events or anomalies for continuous instruments in a monthly report sheet and also document issues for the monitoring manager. Any special events or anomalies for FRM PM<sub>2.5</sub> are recorded on the Chain of Custody sheet and sent to CARB with the filter. Standard logbooks are not used by NSAQMD, but alternative documentation methods are utilized, e.g. electronic files and binders. Station operators may keep their own records, though the records kept are at their own discretion.

### **NSAQMD Field Operation Findings**

**Finding NS1:** The NSAQMD field technicians have instrument manuals but not SOPs. The ARB SOPs are only kept at the District's main office in Grass Valley and are not at field stations. Additionally, the District operations deviate from the ARB SOPs but do not document those deviations.

**Discussion:** SOPs detail the work procedures that are to be conducted or followed within an organization. SOPs document the way activities are to be performed to ensure consistent conformance to technical and quality system requirements and to support data quality. SOPs are intended to be specific to the organization or facility whose activities are described and assist that organization to maintain their quality control and quality assurance processes and ensure compliance with governmental regulations. Well-written SOPs can also serve as training materials and as references for operators, particularly if they are updated regularly (i.e., recommended every three years). SOPs should be distributed in a manner that ensures that only the most recent versions are used and retains historical SOP revisions (these are sometimes called "controlled-copies"). Further guidance on developing SOPs can be found in the EPA guidance document "Guidance for Preparing Standard Operating Procedures", EPA/240/B-01/004, March 2001. Deviations and changes from SOPs should be dated, documented, and kept in a bound or electronic document routinely accessed by and accessible to all staff.

The NSAQMD has modified some of the practices in the ARB SOPs but these deviations are not documented. For example, the NSAQMD uses 5% as an action level for zero/span checks for ozone. CARB uses 10% as an action level. While it is

commendable that the District uses such stringent acceptance criteria, since they are part of the ARB PQAQO they should request approval from ARB to use this tighter criteria.

**Recommendation:** The NSAQMD needs to develop District specific SOPs (with ARB approval) for all monitoring instruments. Alternatively, the NSAQMD can adopt the ARB SOPs.

**Finding NS2:** The NSAQMD record-keeping procedures need to be more rigorous.

**Discussion:** The NSAQMD has no record keeping standard operating procedures. Pollutant instrument information is kept in an electronic format and periodically printed as hardcopies and stored in a binder. Record keeping by individual operators is not consistent and seems to be at the operator's discretion. No station logbooks are maintained. No records for manual PM sampling are maintained.

**Recommendation:** The NSAQMD should develop a SOP for record keeping that includes procedures for utilizing station logbooks, maintaining other necessary records of instrument operations (e.g. QC and maintenance check sheets), provides for regular management review of records, and suitable archiving procedures to ensure the security of these records.

**Finding NS3:** The NSAQMD experiences significant ozone data loss due to a lack of spare parts.

**Discussion:** The NSAQMD experiences significant data gaps because their ozone pumps fail and they don't have spare pumps. They either have to rebuild them or order a new one. 40 CFR 50.11 requires hourly data that are at least 75% complete. To ensure that this requirement is met, prolonged instrument down-time should be avoided, if at all possible.

**Recommendation:** NSAQMD should have at least one spare ozone pump to avoid unnecessary loss of data.

**Finding NS4:** ARB performed audits of the NSAQMD PM instruments do not conform to CFR requirements. Additionally, the NSAQMD stated that the ARB does not perform through the probe audits of NSAQMD ozone monitors.

**Discussion:** Flow audits for PM instruments should occur every 6 months but the schedule has been closer to once/year. For example, the two most recent PM flow audits performed by the ARB were listed by the NSAQMD monitoring manager as occurring on 8/8/2006 and 6/4/2007.

While the ARB performs ozone audits at the required frequency, the NSAQMD monitoring manager noted that during the last two audits, on 6/26/2006 and 6/4/2007, the ARB staff did not perform through-the-probe audits. The NSAQMD monitoring

manager stated that the audit gas was introduced directly into the ozone instruments and not through the sampling train. There was no explanation for this revised procedure.

**Recommendation:** CARB flow checks for PM samplers should be scheduled for every 6 months for PM instruments. Regarding the ozone audits, the ARB needs to ensure that consistent procedures are followed by the audit team. If there is a specific reason why a through-the-probe audit is not possible, this should be communicated to the NSAQMD monitoring manager and documented in the audit report.

**Finding NS5:** There is no feedback from the ARB on outcome of PM filters. See also Laboratory Finding # IL8

**Discussion:** The chain of custody sheets and PM filters are sent from local Districts to the ARB, where all subsequent sample handling and data reporting occurs. The ARB does not report back to Districts for many months so there is no opportunity for make-up sampling runs or to address problems in a timely manner. In the case of exceedance values and PM10 samplers running on a one in six day schedule, Districts need to promptly know when an exceedance of the 24 hour NAAQS occurs so that they have the option of increasing the PM10 sampling frequency to avoid having a single exceedance represent a violation of the NAAQS.

**Recommendation:** Immediately report filter results when they indicate a problem or an exceedance.

**Finding NS6:** The most recent ARB site survey report was not accurate.

**Discussion:** The EPA auditor noted a number of inaccuracies on the ARB audit sheet for Grass Valley, including:

- A tree within 4 m of ozone inlet
- Ozone calibration listed as not current but then was not listed as an action item.
- BAM – the audit report doesn't specify whether the BAM is PM10 or PM2.5. The BAM at Grass Valley is measuring PM2.5 but the purpose listed in the audit sheet is SLAMS. The BAM is not a FEM approved method for PM2.5.
- The logbook at Portola was listed as up to date. I was told there is no logbook.

**Recommendation:** CARB should review siting criteria and information on site survey report during audits.

**Finding NS7:** The NSAQMD does not utilize strip chart backup for its ozone instruments.

**Discussion:** EPA strongly recommends the use of some form of strip chart backup for all continuous instruments. These can be either hard copy strip charts or electronic strip charts. A strip chart record can be an invaluable tool in reviewing data as well as providing an alternative source of data in the event of data logger failure or phone outage.

**Recommendation:** Provide a strip chart back up data recorder for all continuous instruments.

**Finding NS8:** There are trees within 20 m of monitors.

**Discussion:** Siting requirements state that trees should be >20 m from ozone inlet, otherwise they act as obstructions (40 CFR 58, appendix E). At the Grass Valley site, there is a tree within 4 m of the ozone inlet. At the Quincy site there is a group of trees 10-12 m from ozone, PM2.5, and PM10 instruments.

**Recommendation:** The NSAQMD needs to address this siting issue by either trimming or removing the trees or relocating the inlets of the instruments.

### **Great Basin Unified APCD Monitoring Sites**

The Great Basin Unified Air Pollution Control District (GBUAPCD) is the responsible local agency for ambient monitoring in Inyo, Mono and Alpine Counties in California. As stated in the District's QAPP for PM10, "...it is the GBUAPCD's responsibility to develop long-range comprehensive programs to achieve and maintain Federal and state air quality standards. The GBUAPCD is responsible for the implementation of the air quality monitoring program and the enforcement of Federal, State and local rules and regulations governing air quality at the local level".

The Air Quality Monitoring Section conducts all air quality and meteorological monitoring and laboratory activities for the District. The Air Monitoring Specialist, Christopher Lanane, supervises day-to-day operation of the network and the laboratory, including field operations, maintenance and calibrations, field QC, data collection and validation and is responsible for writing the QAPPS. The QA (including performance audits, level 2 data validation and AQS upload) personnel are supervised by the Deputy Air Pollution Control Officer, Duane Ono. The members of GBUAPCD staff interviewed by EPA for this audit include:

Christopher Lanane, Air Monitoring Specialist  
Dan Johnson, Air Quality Technician II  
Guy Davis, Air Quality Technician II  
Gabe Ibarra, Air Quality Technician II  
Jim Parker, Senior Research Analyst  
Phil Kiddoo, Research and Systems Analyst II  
Mike Horn, Air Quality Technician II

All staff interviewed showed a thorough understanding of the monitoring program and required QC and QA practices and their importance in determining the quality of GBUAPCD's monitoring data.

Station operators conduct day-to-day operations as well as instrument repair and maintenance at their assigned stations. Their duties include extensive and well-

documented biweekly, monthly and periodic quality control checks for all instruments and data validation through level 1 at each station. The operators interviewed were familiar with the District QAPPs although copies were not in place at all sites. In part, this is due to the lack of secure storage space at some monitoring stations.

The majority of GBUAPCD's network (8 of 14 SLAMS sites) consists of both filter-based FRM and continuous PM10 monitors for surveillance of known sources: Owens and Mono lakebeds and a geothermal power generator. The District currently does not operate any gaseous criteria pollutant monitors. Under EPA's monitoring regulations, the District has no areas requiring gaseous criteria pollutant monitoring based on the low population of its towns and villages. However, discussion with the District was begun regarding the possibility of establishing a rural NCore station in the air basin.

The monitoring stations visited included Coso Junction, Dirty Socks, Lone Pine, Mono Shore, Lee Vining and Mammoth. The monitoring objectives at each site vary from population-oriented surveillance (Lone Pine, Lee Vining, Mammoth) to source-oriented monitoring (Coso Junction, Keeler, Mono Shore. Station logbooks and instrument logbooks were mostly up to date and contained relevant information on operations, repair and maintenance activities. All sites met the siting criteria of 40 CFR 58, Appendix E, where applicable (population-oriented sites).

GBUAPCD operates an independent QA program for all its PM and meteorological monitoring and laboratory activities. Although there is not a defined manager for QA activities, well-defined and documented QA procedures were clearly described by the personnel interviewed. The District's QA project plans for PM2.5 and PM10 are very thorough and include district-specific standard operating procedures. The QA program includes biweekly flow checks by the station operators, quarterly independent flow audits of the instruments, chain-of-custody procedures for collected filters, a system of QC procedures which are documented for each site, extensive QA/QC for the gravimetric laboratory for both PM10 and PM2.5 filter weighings, monthly data review station-by-station to verify completeness and validity, detailed corrective action procedures, annual calibration of all flow standards (transfer standards and NIST-traceable primary). During the audit, EPA received a copy of GBUAPCD's most recent PM10 QAPP which will be reviewed for approval by Region 9. In 2002, as part of the PM10 QA program, the District employed an outside consultant to conduct an independent System Audit of the PM10 monitoring program which found no compliance issues. Another example of an independent QA program element is the monthly meeting of the District's technical staff which allows for interaction on problem-solving and standardizing of procedures among operators.

GBUAPCD manages all of the ambient monitoring data generated by the district. Data quality objectives and measurement quality objectives have been defined for the GBUAPCD's program. Station operators ensure data collection and sample handling occur according to specific SOPs and validate data from their stations. The QA staff (non-operators) verify and validate data through level two validation, as defined in the QAPPs. Based on a memorandum of understanding with the District, ARB and EPA,

GBUAPCD submits their own data to AQS. Data is archived at either the main office in Bishop or the field office in Keeler.

GBUAPCD maintains a laboratory for weighing PM2.5 and PM10 filters. The laboratory meets or exceeds the gravimetric and temperature and humidity QC requirements for PM2.5 (40CFR Part 50 Appendix L) and therefore, meets and exceeds the requirements for PM10 filter weighings. They employ a rigorous monthly verification procedure for microbalance standards, temperature and humidity measurement checks.

GBUAPCD has provided technical and QA support to tribal monitoring programs within the Great Basin. EPA commends the District for their willingness to extend their monitoring expertise to the development of community monitoring programs by tribal agencies.

### **GBUAPCD Field Operation Findings**

**Finding GB1:** Great Basin operates an independent monitoring, laboratory and QA program from that of ARB.

**Discussion:** GBUAPCD has independent QAPP's for its PM2.5 and PM10 monitoring programs and laboratory operations. The QAPPs incorporate SOP's written by the District. QA oversight by ARB consists of a flow audit once per year.

**Recommendation:** GBUAPCD should be considered an independent QA organization, separate and distinct from the ARB, for purposes of annual data summary statistical evaluation and comparison to the NAAQS.

**Finding GB2:** GBUAPCD's Training program (a QA function) is independent and separate from that of ARB.

**Discussion:** GBUAPCD has independent training and education requirements as part of its General and Ambient Monitoring-specific training.

**Recommendation:** See Finding GB1.

**Finding GB3:** Logbooks were not all up to date and signed by the GBUAPCD operators at all stations.

**Discussion:** Logbooks are an important legal record for defending the monitoring data collected by an agency. They show the activity by the operator at the site.

**Recommendation:** Logbooks should be signed and entries should reflect on-site activities which may effect data validation and/or completeness.